

NON-PUBLIC?: N  
ACCESSION #: 9507180028  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: SURRY POWER STATION, Unit 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000281

TITLE: Unit 2 Auto Reactor Trip Due to Main Transformer  
Protective Differential Relay Actuation  
EVENT DATE: 06/14/95 LER #: 95-006-00 REPORT DATE: 07/13/95

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: D. A. Christian, Station Manager TELEPHONE: (804) 357-3184

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

On June 14, 1995, Unit 2 was operating at 100% power. At 1415 hours, the Main Transformer and Generator Differential Lockout Relay Trip annunciator alarmed in the main control room. The annunciator was initiated by the main transformer protective relaying circuitry phase A. The actuation of the Main Transformer Protective Differential Relay 2-EP-87-TL-A initiated a generator trip, followed by turbine and reactor trips. Appropriate operator actions were taken in accordance with emergency operating procedures to ensure the performance of system automatic actions and to respond to abnormal conditions. The unit was quickly brought to a stable, no-load condition. A Root Cause Evaluation (RCE) was initiated to determine the cause of this event and to recommend corrective actions. At the time of the reactor trip, a heater transformer was being replaced in a main transformer control cabinet. The RCE investigation concluded that an inadvertent action during this maintenance activity could have caused relay 2-EP-87-TL-A to actuate.

However, a walk-through task analysis and interviews with the personnel involved could not confirm that an inadvertent action had occurred. As an enhancement, the main transformer control cabinets will be labeled to indicate the potential consequences while working in these cabinets. Appropriate portions of the main transformer protective relaying circuitry were extensively tested. No electrical faults were identified. Relay 2-EP-87-TL-A was replaced as a precautionary measure. The exact cause of this event could not be determined. This report is being submitted pursuant to 10 CFR 50.73 (a)(2)(iv).

END OF ABSTRACT

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## 1.0 DESCRIPTION OF THE EVENT

On June 14, 1995, Unit 2 was operating at 100% power. At 1415 hours, a differential fault was indicated by the actuation of Main Transformer Protective Differential Relay 2-EP-87-TL-A EHS-EL,51!. This relay is used as the principal form of fault protection for the main transformer and generator leads. Relay 2-EP-87-TL-A energized and actuated the Main Transformer and Generator Leads Differential Lockout Relay 2-EP-86-TL EHS-EL,86!. The lockout relay energized and, as designed, initiated a generator trip, followed by turbine and reactor trips.

The auxiliary feedwater pumps EHS-BA-P! started on low-low steam generator (SG) water level, as designed, and provided flow to the SGs. The Anticipated Transient Without Scram Mitigation System Actuation Circuitry (AMSAC) armed and initiated as designed. The main steam dump valves EHS-SB,TCV! automatically opened to admit steam to the main condenser. The Reactor Coolant System (RCS) reached a minimum temperature of approximately 540 degrees F and subsequently stabilized at 547 degrees F. The reactivity shutdown margin was calculated following the RCS cooldown to ensure that Technical Specification and administrative shutdown margin limits were satisfied.

The following discrepancies were noted during the post-trip response:

- o The Reactor Coolant Pump (RCP) 2-RC-P-1C vapor seal head tank high level and seal leak-off low flow annunciators alarmed. Control Room Operators monitored RCP EHS-AB,P! parameters in accordance with Abnormal Procedure 2-AP-9-00, RCP Abnormal Conditions. The alarms cleared without additional operator

action when the RCS pressure returned to normal.

- o The Feedwater Pump Recirculation Valve 2-FW-FCV-250B position indicator light EIIS-SJ,FCV,ZI! in the Main Control Room did not illuminate to indicate that the valve was open. The valve was locally verified to be open.

- o Main Steam Dump Valve 2-MS-TCV-206A remained open longer than expected. Approximately two minutes after the reactor trip, the valve reopened for about 30 seconds without any demand signal present. The instrument air to the valve was subsequently isolated to prevent any further spurious actuations.

- o The illumination of the Individual Rod Position Indication (IRPI) rod bottom light EIIS-AA,ZI! for Control Rod M-10 was delayed.

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## 1.0 DESCRIPTION OF THE EVENT (Continued)

At the time of the reactor trip, utility maintenance personnel were replacing the cabinet heater transformer EIIS-EL,CAB,EHTR,XFMR! in the Main Transformer C control cabinet. The cabinet heater transformers in the Main Transformer A and B control cabinets had been previously replaced without incident.

The NRC was notified pursuant to 10 CFR 50.72 (b)(2)(ii) on June 14, 1995 at 1756 hours. This report is being submitted pursuant to 10 CFR 50.73 (a)(2)(iv) as an automatic actuation of the Reactor Protection (RPS) EIIS-JC! and Auxiliary Feedwater Systems.

## 2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

This event resulted in no safety consequences or implications. Appropriate operator actions were taken in accordance with emergency operating procedures to ensure the performance of system automatic actions and to respond to abnormal conditions. The unit was quickly brought to a stable, no-load condition. Therefore, the health and safety of the public were not affected at any time during this event.

## 3.0 CAUSE OF THE EVENT

A Root Cause Evaluation (RCE) investigation was initiated on June

14, 1995 to determine the cause of this event and to recommend corrective actions. The RCE determined that a differential lockout of Main Transformer A caused the generator trip which resulted in the turbine and reactor trips.

The differential lockout of Main Transformer A occurred when a time overcurrent fault was indicated by the actuation of Main Transformer Protective Differential Relay 2-EP-87-TL-A. An input to relay 2-EP-87-TL-A is provided from a current transformer through a terminal block in the Main Transformer C control cabinet. At the time of the reactor trip, utility maintenance personnel were replacing the heater transformer in the Main Transformer C control cabinet. The RCE investigation determined that an inadvertent action during this maintenance activity could have caused relay 2-EP-87-TL-A to actuate. However, a walk-through task analysis and interviews with the personnel involved could not confirm that an inadvertent action had occurred.

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### 3.0 CAUSE OF THE EVENT (Continued)

The protective differential current relay circuitry and associated components were extensively tested, as discussed in Section 5.0, and found to be acceptable. Based on the results of this testing and the investigation of the maintenance activity in the Main Transformer C control cabinet, the RCE could not conclusively determine the cause of this event.

### 4.0 IMMEDIATE CORRECTIVE ACTION(S)

Following the reactor trip, Control Room Operators acted promptly to place the unit in a safe, shutdown condition in accordance with emergency and other operating procedures.

The Shift Technical Advisor monitored the critical safety function status trees to ensure that plant parameters remained acceptable.

### 5.0 ADDITIONAL CORRECTIVE ACTION(S)

Operating parameters on the main transformers were reviewed and determined to be satisfactory. No electrical faults on the transformers were recorded before the reactor trip. The protective differential current relay circuitry and the current transformers that provide input to relay 2-EP-87-TL-A were extensively tested and found to be acceptable.

Relay 2-EP-87-TL-A was replaced as a precautionary measure. The replacement relay was tested satisfactorily and Unit 2 was returned to service on June 17, 1995 at 0232 hours.

Following its removal, relay 2-EP-87-TL-A was visually inspected and mechanical and electrical laboratory testing was performed. The testing included operation of the relay while subjected to a ferroskan device. A ferroskan device was in operation in the area of the relay at the time of the reactor trip. The testing revealed no problems that would cause the relay to actuate under normal load conditions.

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#### 5.0 ADDITIONAL CORRECTIVE ACTION(S) (Continued)

An Engineering evaluation of the RCP 2-RC-P-1C response following the reactor trip was performed. The evaluation noted that the No. 2 seal on RCP 2-RC-P-1C had exhibited similar performance during the previous two Unit 2 reactor trips. During these events, the response data indicates that the No. 2 seal opened temporarily and subsequently resealed. The evaluation noted that the RCP seal is capable of opening on a high differential pressure condition and concluded that no seal problems exist since the No. 2 seal closed spontaneously, and the No. 1 and No. 2 seal leak-off flow returned to normal. Manufacturer recommendations for monitoring the No. 1 and No. 2 seals have been implemented. Engineering will continue to monitor seal performance.

The Feedwater Pump Recirculation Valve 2-FW-FCV-250B position indicator light was examined to determine why it failed to illuminate. A misalignment of the indicator light bulb and socket was determined to be the cause of the failure. The indicator light bulb was replaced to correct the condition.

The Main Steam Dump Valve 2-MS-TCV-206A was inspected to determine why the valve did not properly operate. The inspection revealed that a screw was missing from the valve positioner feedback arm linkage. The self-tapping screw was most likely loosened by vibration. The missing screw was replaced and a thread locking compound was applied. The other main steam dump valve positioner feedback arm linkages were inspected and found to be acceptable.

A hot rod drop test was conducted which verified that Control Rod M-10 is fully operable. The IRPI rod bottom light for Control Rod

M-10 has exhibited a slow response following reactor trips for several years. Engineering and vendor personnel have evaluated this condition and several actions have been implemented to correct it. These actions include the performance of Time Domain Reflectometry testing, resistance and inductance testing, and the replacement of the M-10 IRPI coil stack and signal conditioning module. Additional testing and maintenance actions are being evaluated.

## 6.0 ACTIONS TO PREVENT RECURRENCE

This event was an isolated occurrence and no additional corrective actions are planned. As an enhancement, the main transformer control cabinets will be labeled to indicate the potential consequences while working in these cabinets.

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## 7.0 SIMILAR EVENTS

A Unit 2 automatic reactor trip occurred on August 27, 1993 when both reactor trip breakers opened simultaneously. The Reactor Protection System actuation resulted from the partial actuation (chattering) of the train B safety injection master relay SIA-B during monthly safeguards actuation logic functional testing. Licensee Event Report 50-281/93-005-00 reported this event.

A Unit 2 automatic reactor trip occurred on August 23, 1993 as a result of a loss of excitation field for the main generator. This event was caused by an intermittent failure of a phase shifter card in the firing circuit of the main generator's voltage regulator. Licensee Event Report 50-281/93-005-00 reported this event.

A Unit 2 automatic reactor trip occurred on September 18, 1989. This event was caused by the spurious actuation of the main generator backup impedance relay KD-41. Testing of relay KD-41 identified two faults. Licensee Event Report 50-281/89-009-00 reported this event.

## 8.0 MANUFACTURER/MODEL NUMBER

N/A

## 9.0 ADDITIONAL INFORMATION

Unit 1 was operating at 100% power and was not affected by this event.

ATTACHMENT TO 9507180028 PAGE 1 OF 1

10CFR50.73

Virginia Electric and Power Company  
Surry Power Station  
P. O. Box 315  
Surry, Virginia 23883

June 13, 1995

U. S. Nuclear Regulatory Commission Serial No.: 95-364  
Document Control Desk SPS: BCB  
Washington, D. C. 20555 Docket No.: 50-281  
License No.: DPR-37

Dear Sirs:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Unit 2.

REPORT NUMBER

50-281/95-006-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

D. A. Christian  
Station Manager

Enclosure

pc: Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

M. W. Branch  
NRC Senior Resident Inspector  
Surry Power Station

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